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 MADISON, WIS.

In Cooperation with the University of Wisconsin

LIST OF PUBLICATIONS ON

DRYING OF WOOD

This list includes publications that present the results of research by the Forest Products Laboratory in this particular field of wood products research.

Single copies of the various items may be obtained free upon request from the Director, Forest Products Laboratory, Post Office Box 5130, Madison, WI 53705. Classroom quantities are not available because of limited printing and storage facilities.

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CATALOGING - PREP.

Title	Author	Publication and date
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PHYSICAL PROPERTIES OF WOOD RELATED TO DRYING

A. Permeability and Diffusion

Directional permeability of softwoods.	Comstock, G. L.	Wood and Fiber 1(4): 283-289. 1970.
Relationship between permeability of green and dry eastern hemlock.	Comstock, G. L.	Forest Prod. J. 18(8):20-23. Aug. 1968.

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PHYSICAL PROPERTIES OF WOOD RELATED TO DRYING--Cont.

A. Permeability and Diffusion--Cont.

Factors affecting permeability and pit aspiration in coniferous sapwood.	Comstock, G. L., and Cote, W. A.	Wood Sci. and Tech. 2:279-291. 1968.
Longitudinal permeability of green eastern hemlock.	Comstock, G. L.	Forest Prod. J. 15(10):441-449. Oct. 1965.

B. Shrinkage and Swelling

Maximum initial moisture contents for kiln-drying 4/4 hardwoods at high temperatures.	Wengert, E. M.	For. Prod. J. 24(8):54-56. Aug. 1974.
Predicting equilibrium moisture content of wood by mathematical models.	Simpson, W. T.	Wood and Fiber 5(1):41-49. 1973.
Relation of comparative diffusion rates of oak ray and surrounding tissue to check formation.	Simpson, W. T.	Wood and Fiber. 5(1):34-40. 1973.
Longitudinal shrinkage in seven species of wood.	Hann, R. A.	U.S. Forest Serv. Res. Note FPL-0203. 1969.
Effect of restrained swelling on wood moisture content.	Simpson, W. T., and Skaar, C.	U.S. Forest Serv. Res. Note FPL-0196. 1968.
Effect of transverse compressive stress on loss of wood.	Simpson, W. T., and Skaar, C.	U.S. Forest Serv. Res. Note FPL-0197. 1968.
Thermodynamics of water sorption by wood.	Skaar, C., and Simpson W. T.	Forest Prod. J. 18(7):49-58. July 1968.

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PHYSICAL PROPERTIES OF WOOD RELATED TO DRYING--Cont.

B. Shrinkage and Swelling--Cont.

Dimensional changes in kiln-dried softwood lumber after surfacing and during storage.	:	Comstock, G. L.	:	U.S. Forest Serv. Res. Note FPL-0144. 1966.
Shrinkage of coast-type Douglas-fir and old-growth redwood boards.	:	Comstock, G. L.	:	U.S. Forest Serv. Res. Pap. FPL 30. 1965.

C. Moisture Content

Equilibrium moisture content prediction for wood.	:	Simpson, W. T.	:	Forest Prod. J. 21(5):48-49. May 1971.
Effects of wood preservatives on electrical moisture meter readings.	:	James, W. L.	:	U.S. Forest Serv. Res. Note FPL-0106. 1966.
Calibration of electric moisture meters for some wood species grown in Hawaii.	:	James, W. L.	:	U.S. Forest Serv. Res. Note FPL-061. 1964.
Kiln samples (ch. 6, Dry Kiln Operator's Manual)	:		:	(See Kiln Drying of Lumber).
Wood Properties in relation to drying. (ch. 2, Air Drying of Lumber	:		:	(See Air Drying Treatments).

D. Stresses

Effect of prestaming on moisture gradient of Northern red oak during drying.	:	Simpson W. T.	:	Wood Science 8(4):272-276. April 1976.
Control of reddish-brown coloration in drying maple sapwood.	:	McMillen, J. M.	:	U.S. Forest Serv. Res. Note FPL-0231. 1976.

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PHYSICAL PROPERTIES OF WOOD RELATED TO DRYING--Cont.

D. Stresses--Cont.

Physical characteristics of seasoning discolorations in sugar maple sapwood.	: McMillen J. M.	: U.S. Forest Serv. Res. Pap. FPL 248. : 1975.
A "pinned" sticker to reduce crook in kiln-drying lumber.	: Wengert, E. M., and : Baltes, R. C.	: For. Prod. J. : 24(8):23-24. : Aug. 1974.
Honeycomb and ring failure in bacterially infected red oak lumber after kiln drying.	: Ward, J. C., : Hann, R. A., : Baltes, R. C., and : Bulgrin, E. H.	: U.S. Forest Serv. Res. Pap. FPL 165. : 1972.
Seasoning factors for modulus of elasticity and modulus of rupture.	: Gerhards, C. C.	: Forest Prod. J. : 18(11):27-35. : Nov. 1968.
Transverse strain during drying of 2-inch ponderosa pine.	: McMillen, J. M.	: U.S. Forest Serv. Res. Pap. FPL 83. : 1968.
Tensile, compressive, and shearing stresses developed in red oak as it dries.	: Youngs, R. L., and : Bendtsen, B. A.	: Forest Prod. J. : 14(3):113-118. : Mar. 1964.

E. Other Problems Related to Drying

Gray-brown chemical stain in southern hardwoods.	: Bois, P. J.	: U.S. Forest Serv. FPU Tech. Rep. No. 1. : 1970.
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PHYSICAL PROPERTIES OF WOOD RELATED TO DRYING--Cont.

E. Other Problems Related to Drying--Cont.

Dip treatment in polyethylene glycol not effective in preventing surface checking. : Rietz, R. C. : U.S. Forest Serv. Res. Note FPL-0204. 1969.

Prevention of pinkish-brown discoloration in drying maple sapwood. : McMillen, J. M. : U.S. Forest Serv. Res. Note FPL-0193. 1968.

Sun-following rack accelerates weathering of wood products. : Wengert, E. M., and Koster, A. L. : Solar Energy 12: 267-272. 1968.

Quality of studs kiln-dried by high and conventional temperatures. : Kimball, K. E., and Lowery, D. P. : Forest Prod. J. 17(9):81-85. Sept. 1967.

Standard terms for describing wood. : : U.S. Forest Serv. Res. Note FPL-0171. 1967.

Comparative strength of air-dried and kiln-dried wood. : : U.S. Forest Serv. Res. Note FPL-055. 1964.

Characteristics of Alaska wood. : : U.S. Forest Serv. Res. Pap. FPL 1. 1964.

VARIOUS METHODS OF DRYING LUMBER

Air Drying

A calendar for air-drying lumber in the upper Midwest. : Rietz, R. C. : U.S. Forest Serv. Res. Note FPL-0224. 1972.

Air drying of lumber: A guide to industry practices. : Rietz, R. C., and Page, H. : USDA Agr. Handb. No. 402. 110 p. 1971. (Copies may be purchased from the Superintendent of Documents, GPO, Washington, D.C. 20402. Price - \$1.00)

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VARIOUS METHODS OF DRYING LUMBER--Cont.

Air Drying--Cont.

Air-drying lumber in stickered packages.	: Rietz, R. C.	: So. Lbrmn. 221(2752): 99-103.
	:	: Dec. 15, 1970.
Air drying lumber in a fork-lift yard.	: Rietz, R. C.	: U.S. Forest Serv. Res. Note FPL-0209. 1970.
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A method of seasoning small quantities of lumber.	: Rasmussen, E. F.	: U.S. Forest Serv. Res. Note FPL-089. 1965.
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Kiln Drying

Kiln drying sinker heartwood from young-growth Western hemlock: Preliminary Evaluation.	: Ward, J. C., and Kozlik, C. J.	: Proc. Western Dry Kiln Clubs 26th Annual Meeting May 1-2, 1975. Oregon State University, Corvallis, Oreg.
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How to reduce energy consumption in kiln-drying 4/4 hardwoods at high temperatures.	: Wengert, E. M.	: U.S. Forest Serv. Res. Note FPL-0228. 1974.
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Kiln drying of selected Colombian woods.	: McMillen, J. M., and Boone, R. S.	: Forest Prod. J. 24(4):31-36. Apr. 1974.
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Schedules for foreign woods.	: McMillen, J. M., and Bois, P. J.	: U.S. Forest Serv. FPU Tech. Rep. No. 2. March 1972.
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Review of high-temperature kiln-drying of hardwoods.	: Wengert, E. M.	: So. Lbrmn. 17-19. Sept. 15, 1972.
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New kiln schedule for pre-surfaced oak lumber.	: McMillen, J. M., and Baltés, R. C.	: Forest Prod. J. 22(5):19-26. May 1972.
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VARIOUS METHODS OF DRYING LUMBER--Cont.

Kiln Drying--Cont.

Accelerated oak drying by presurfacing, accelerated schedules, and kiln automation.	:	Wengert, E. M., and Baltes, R. C.	:	U.S. Forest Serv. Res. Note FPL-0214. 1971.
Dry kiln automation.	:	Wengert, E. M.	:	So. Lbrmn. Dec. 15, 1971.
Automatic programing and control for steam-heated lumber dry kilns.	:	Wengert, E. M., and Evans, P. G.	:	Forest Prod. J. 21(2):56-59. 1971.
Improvements in solar dry kiln design.	:	Wengert, E. M.	:	U.S. Forest Serv. Res. Note FPL-0212. 1971.
Partial list of lumber dry kiln manufacturers in the United States.	:		:	FPL Rep. 74-020. 1974.
Accelerating the kiln drying of hardwoods.	:	Rietz, R. C.	:	So. Lbrmn. 221(2741): 19-22, 26, 27, 30. July 1, 1970.
Properties of imported tropical woods. (Kiln schedules included.)	:	Kukachka, B. F.	:	U.S. Forest Serv. Res. Pap. FPL 125. 1970.
Computer programmed kiln controls expected to save time and money.	:	Wengert, E. M.	:	Wood & Wood Products. Mar. 1970.
Accelerated kiln drying of presurfaced 1-inch northern red oak.	:	McMillen, J. M.	:	U.S. Forest Serv. Res. Pap. FPL 122. 1969.
Influence of initial drying temperatures on the development of warp in 1-inch hard maple.	:	Rietz, R. C.	:	Forest Prod. J. 19(7):37-40. July 1969.
Producing check-free beech for turnings.	:	Rietz, R. C., and Jenson, J. A.	:	Forest Prod. J. 18(11):42-44. Nov. 1968.

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VARIOUS METHODS OF DRYING LUMBER--Cont.

Kiln Drying--Cont.

Seasoning and handling of ramin.	:	McMillen, J. M.	:	U.S. Forest Serv. Res. Note FPL-0172. 1967.
Present methods of drying and conditioning wood for use.	:	Youngs, R. L.	:	Economic Bot. 21(1): 46-50. Jan.-Mar. 1967.
Operation and maintenance of lumber dry kilns.	:		:	U.S. Forest Serv. Res. Note FPL-0118. 1966.
News and views of this kiln drying business: Pre- surfacing green oak lumber to reduce surface checking.	:	Rietz, R. C., and Jenson, J. A.	:	U.S. Forest Serv. Res. Note FPL-0146. 1966.
News and views of this kiln drying business: Warp reduction.	:		:	U.S. Forest Serv. Res. Note FPL-0108. 1965.
The kiln drying of wood.	:	Rietz, R. C.	:	Spec. Tech. Pub. No. 385, p. 38-51. 1965.
Comparative strength of air- dried and kiln-dried wood.	:		:	U.S. Forest Serv. Res. Note FPL-055. 1964.
Dry kiln operator's manual.	:	Rasmussen, E. F.	:	USDA Agr. Handb. No. 188. 1961. Copies may be obtained from the Superintendent of Documents, GPO, Washington, D.C. 20402. Price - \$2.65.

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VARIOUS METHODS OF DRYING LUMBER--Cont.

Kiln Drying--Cont.

Separates from Dry Kiln	:		:	USDA Agr. Handb. No. 188.
Operator's Manual.	:		:	1961. Individual
<u>Chapter</u>	:		:	copies of separates
	:		:	available from
Introduction	:		:	Forest Products
	:		:	Laboratory.
1. Properties of wood	:		:	
related to drying.	:		:	
2. Kiln types and features.	:		:	
3. Auxiliary kiln equipment.	:		:	
4. Inspection and	:		:	
maintenance of dry kilns.	:		:	
5. Stacking lumber and other	:		:	
items for kiln drying.	:		:	
6. Kiln samples.	:		:	
7. Loading the dry kiln.	:		:	
8. Kiln schedules and	:		:	
drying time.	:		:	
9. Drying defects.	:		:	
10. Operating a dry kiln.	:		:	
11. Storage of wood.	:		:	

Special Drying Methods

Effect of steaming on the	:	Simpson W. T.	:	Wood Science
drying rate of several species	:		:	7(3):247-255. 1975.
of wood.				
Salvaging flooded lumber.	:		:	U.S. Forest Serv. FPU
	:		:	Tech. Rep. No. 5.
	:		:	April 1973.
A check list for drying	:	Bois, P. J., and	:	U.S. Forest Serv. FPU
small amounts of lumber.	:	Wengert, E. M.	:	Tech. Rep. No. 6.
	:		:	July 1973.
Enzyme mixture improves creosote	:	Tschernitz, J. L.	:	Forest Prod. J.
treatment of kiln-dried	:		:	23(3):30-38.
Rocky Mountain Douglas-fir.	:		:	March 1973.

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VARIOUS METHODS OF DRYING LUMBER--Cont.

Special Drying Methods--Cont.

Accelerating oak air drying by presurfacing.	:	Simpson, W. T., and Baltes, R. C.	:	U.S. Forest Serv. Res. Note FPL-0223. 1972.
Press drying nine species of wood.	:	Hittmeier, M. E., Comstock, G. L., and Hann, R. A.	:	Forest Prod. J. 18(9):91-96. Sept. 1968.
High-temperature drying of lumber--a review.	:	Lowery, D. P., Krier, J. P., and Hann, R. A.	:	U.S. Forest Serv. Res. Pap. INT 48. 1968. :
Accelerated methods of drying thick-sliced and thin-sawed loblolly pine.	:	Kimball, K. E.	:	Forest Prod. J. 18(1):31-38. Jan. 1968.
Quality of studs kiln dried by high and conventional temperatures.	:	Kimball, K. E., and Lowery, D. P.	:	Forest Prod. J. 17(9):81-85. Sept. 1967.
Methods for drying lodgepole pine and western larch.	:	Kimball, K. E., and Lowery, D. P.	:	Forest Prod. J. 17(4):32-40. Apr. 1967.
Paneling and flooring from low-grade hardwood logs. (Press-dried paneling.)	:	Heebink, B. G., and Compton, K. C.	:	U.S. Forest Serv. Res. Note FPL-0122. 1966.
Drying yellow-poplar at temperatures above 100° C.	:	Hann, R. A.	:	Forest Prod. J., p. 215-220. May 1964.

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VARIOUS METHODS OF DRYING LUMBER--Cont.

Special Drying Methods--Cont.

Veneer cutting and drying properties:	:		:	U.S. Forest Serv. Res. Note FPL-0163. 1967.
Western larch.	:		:	
Tanoak.	:		:	U.S. Forest Serv. Res. Note FPL-0164. 1967.
Pacific madrone.	:		:	U.S. Forest Serv. Res. Note FPL-094. 1965.
Water oak.	:		:	U.S. Forest Serv. Res. Note FPL-0105. 1965.
Cottonwood.	:		:	U.S. Forest Serv. Res. Note FPL-044. 1964.
Tupelo.	:		:	U.S. Forest Serv. Res. Note FPL-017. 1963.

MOISTURE CONTENT AND TEMPERATURE CONTROL
DURING FABRICATION AND USE

Electric moisture meters for wood.	:	James, W. L.	:	U.S. Forest Serv. Gen. Tech. Rep. FPL 6. 1975.
Maintaining moisture content conditions during lumber storage.	:	Bois, P. J.	:	U.S. Forest Serv. FPU Tech. Rep. No. 3.
Equilibrium moisture prediction for wood.	:	Simpson, W. T.	:	Forest Prod. J. 21(5):48. May 1971.
Moisture content of laminated timbers.	:	Hann, R. A., Oviatt, A. E., Markstrom, D. M., and Duff, J. E.	:	U.S. Forest Serv. Res. Pap. FPL 149. 1970.
Electrical analog approach to heat flow through wood-frame walls.	:	Wengert, E. M.	:	Forest Prod. J. 18(1):99-101. Jan. 1968.
Drying and conditioning glued joints.	:		:	U.S. Forest Serv. Res. Note FPL-0190. 1968.

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MOISTURE CONTENT AND TEMPERATURE CONTROL
DURING FABRICATION AND USE--Cont.

An analog computer for predicting surface temperature of wood.	:	Wengert, E. M.	:	U.S. Forest Serv. Res. Note FPL-0171. Aug. 1967.
Parameters for predicting maximum surface temperatures of wood in exterior exposures.	:	Wengert, E. M.	:	U.S. Forest Serv. Res. Pap. FPL 62. May 1966.
Theoretical considerations in the drying of wood at pressures above atmospheric.	:	Hann, R. A.	:	Forest Prod. J. 16(4):25-32. Apr. 1966.
Make your own low-cost controlled-humidity room.	:	Heebink, B. G.	:	Plywood Mag., p. 24-26. Mid-February 1964.
Study of temperatures in wood parts of houses throughout the United States.	:	Heyer, O. C.	:	U.S. Forest Serv. Res. Note FPL-012. 1963.

RELATED PUBLICATIONS

A look at and a result of reorganizing drying research at Forest Products Laboratory.	:	Hann, R. A., and Ward, J. C.	:	Presented at 23rd Annual Mtg. of Western Dry Kiln Clubs, May 8, 1972.
List of manufacturers and dealers for log and lumber end coatings that reduce checking and splitting.	:		:	FPL Rep. 71-021. 1971.
Electrical analog approach to heat flow through wood-walls.	:	Wengert, E. M.	:	Forest Prod. J. 18(1):99-102. January 1968.
How PEG helps the hobbyist who works with wood.	:	Mitchell, H. L.	:	Unnumbered report. Copies may be purchased from the Superintendent of Documents, GPO, Washington, DC 20402. Price \$1.05.